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Paper No. 12: Network Scheduling of Shipyard Production, Engineering, and Material Procurement

U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

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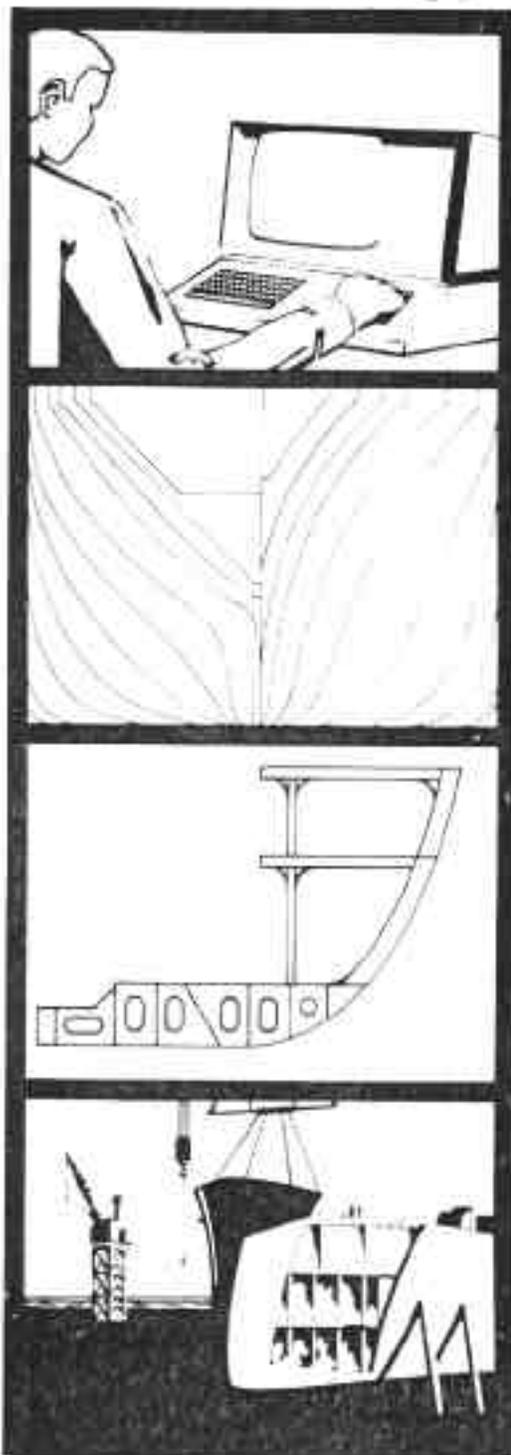
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R RESEARCH
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PRODUCTIVITY
IN
SHIPBUILDING

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September 11-13, 1979
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**NETWORK SCHEDULING OF SHIPYARD PRODUCTION,
ENGINEERING AND MATERIAL PROCUREMENT**

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SPAR Associates Incorporated
Annapolis, Maryland**

As Director of Shipyard Planning Services, Mr. Boucher is currently responsible for production planning and control services in shipyards, as well as system development and research. For the past 7 years, he has been involved in assisting various shipyards in the United States and Canada to improve their planning techniques and cost/schedule control systems. SPAR is currently engaged in providing production scheduling services to a number of yards in support of their planning staffs.

Prior to his involvement with SPAR, Mr. Boucher studied business administration and worked in management consulting.

PERT-PAC FEATURES

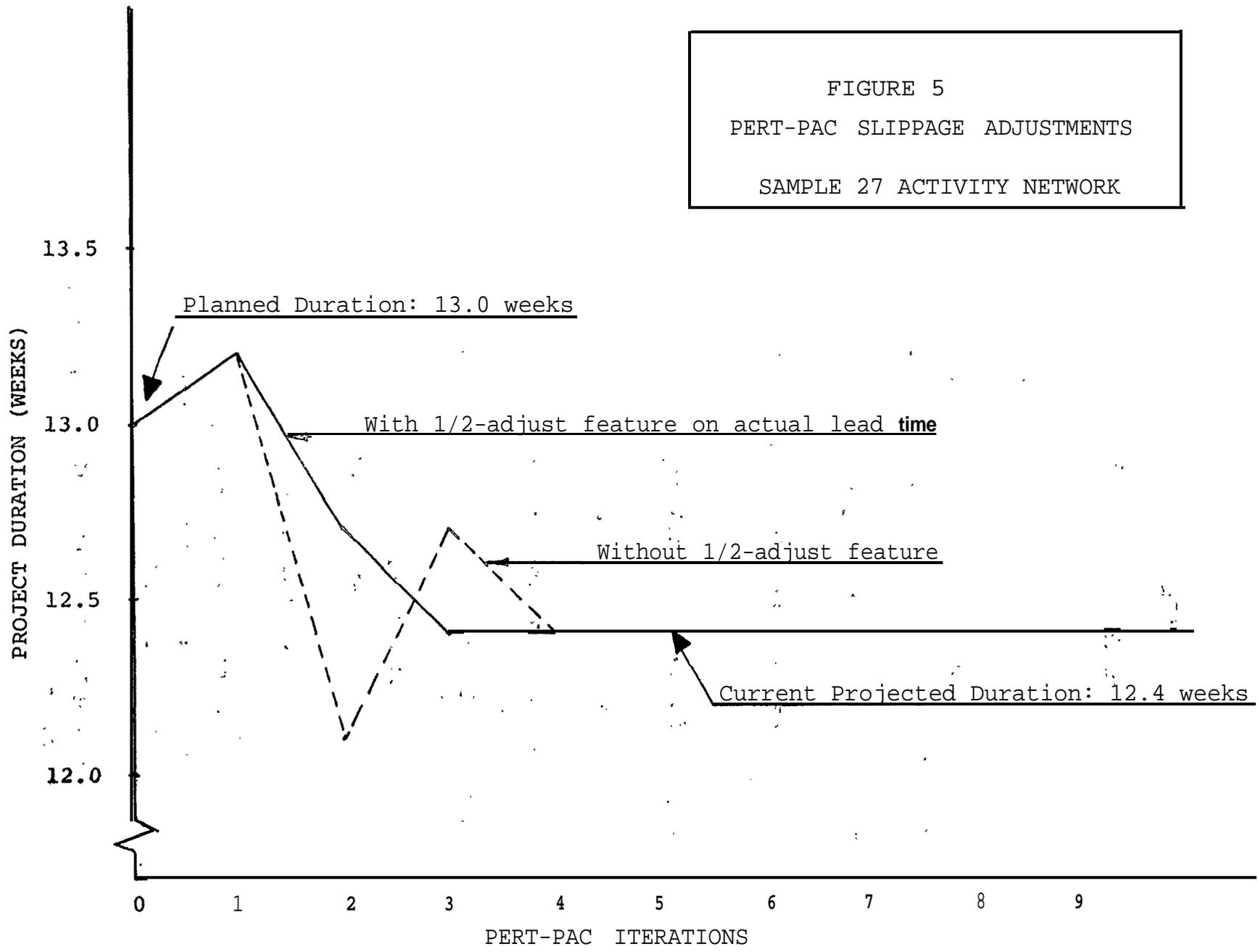
- * Random network node numbering
- * Multiple starting/ending, networks
- * Sub-network, processing
- * Multiple network processing
- * Automatic network, loop detection
- * Positive or negative activity lead time
- * Automatic holiday and/or weekend schedule adjustment
- * Automatic work week or shift adjustments
- * Various activity sort list options
- * Activity schedule bar charts
- * Detailed node event schedule reports
- * Summary milestone event schedule reports
- * Critical activities analysis reports
- * Activity cataloging to work breakdown structure, production work centers, ship zone, and/or steel unit.

PERT-PAC

SPECIAL BENEFITS

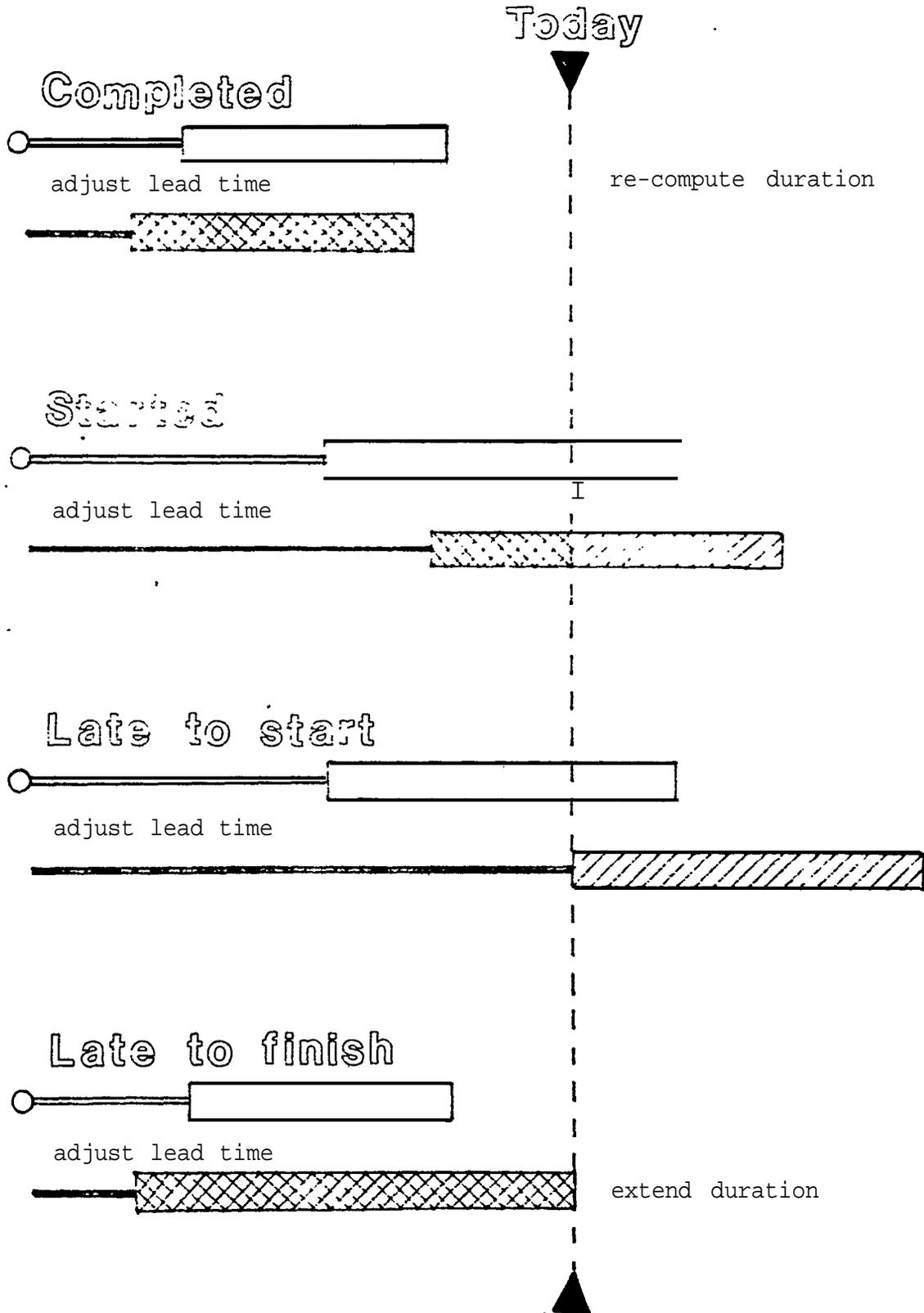
- * Direct access to WORK-PAC and performance information
- * Simultaneous processing of preliminary planning work packages with actual, detailed production work packages
- * Automatic re-scheduling of WORK-PAC options
- * Automatic network updating; manual progress assessments not required
- * Automated in-progress work adjustments
- * Automated completed work adjustments
- * Automated lead time adjustments
- * Management visibility through schedule summary reports
 - Milestone Report
 - Critical Activity Report
- * Schedule variance reporting
 - ' Automatic comparison of planned versus actual and current projected schedules
 - Total Project Slippage Report
- * Automatic impact visibility of change orders and design changes

FIGURE 5
PERT-PAC SLIPPAGE ADJUSTMENTS
SAMPLE 27 ACTIVITY NETWORK



220

AUTOMATED ADJUSTMENTS



PERT-PAC CRITICAL ACTIVITY ANALYSIS

2/ 1/0

PAGE 1

HULL W/C	PRG	DESCRIPTION	PLANNED			CURRENT		WKS	DELAY	
			START	FINISH		START	FINISH	STAKT	FINISH	
1980.	0.	500.	REMOVE REFRACTIMATRL	1/ 8/0	1/15/0	C	1/ 3/0	1/14/0	-0.3	-0.1
1980.	0.	300.	REMOVE AIR REGISTERS	1/ 1/0	1/ 4/0	C	1/ 5/0	1/ 7/0	0.6	0.4
1980.	0.	400.	INITIAL HYDRO TEST	1/ 1/0	1/ 5/0	C	1/ 2/0	1/ 7/0	C.1	0.3
1980.	0.	1300.	REPAIR INNER CASING	1/15/0	3/ 7/0	S	1/11/0	3/ 3/0	-0.6	-0.6
1980.	0.	2300.	CHEM CLEAN TURBINE	3/ 7/0	3/11/0		3/ 3/0	3/ 7/0	-0.6	-0.6
1980.	0.	2400.	PRELIM HYDRO TEST	3/11/0	3/19/0		3/ 7/0	3/15/0	-0.6	-0.6
1980.	0.	2600.	INSTALL DRUM INTRNLS	3/19/0	3/28/0		3/15/0	3/24/0	-0.6	-0.6
1980.	0.	2700.	FINAL HYDRO TEST	3/28/0	4/ 1/0		3/24/0	3/27/0	-0.6	-0.7
1980.	0.	2800.	INSTL PLASTIC REFPAC	4/ 1/0	4/ 1/0		3/27/0	3/28/0	-0.7	-0.6
1980.	0.	1100.	EXPLORATORY BLOCK	1/15/0	1/30/0	S	1/15/0	2/ 1/0	0.0	0.3
1980.	0.	1700.	R-R SPR HT TUBES	1/30/0	3/ 1/0		2/ 2/0	3/ 2/0	0.4	0.1
1980.	0.	2100.	REPAIR OUTER CASING	3/ 7/0	4/ 1/0		3/ 3/0	3/27/0	-0.6	-0.7
1980.	0.	500.	REPAIR BILGE CASING	1/16/0	2/22/0	S	1/17/0	2/22/0	0.1	0.0
1980.	0.	200.	REMOVE BILGE CASING	1/ 1/0	1/16/0	C	1/ 3/0	1/17/0	0.3	0.1
1980.	0.	1200.	FINISH REPAIR CASING	2/22/0	3/25/0		2/22/0	3/26/0	0.0	0.1
1980.	0.	900.	REMOVE DRUM INTRNLS	1/ 5/0	1/ 8/0	C	1/ 3/0	1/ 9/0	-0.3	0.1
1980.	0.	2200.	RE-BRICK	3/ 7/0	3/17/0		3/ 3/0	3/13/0	-0.6	-0.6
1980.	0.	2500.	INSTALL AIR REGISTRS	3/17/0	3/25/0		3/13/0	3/21/0	-0.6	-0.6
1980.	0.	1800.	R-R SUPPORT TUBES	1/30/0	3/ 1/0	S	1/27/0	2/25/0	-0.4	-0.6
1980.	0.	1000.	REPAIR SLIDING SEAT	1/23/0	2/22/0	S	1/20/0	2/18/0	0.4	-0.6
1980.	0.	600.	INSPECT SLIDING SEAT	1/16/0	1/23/0	S	1/17/0	2/ 1/0	0.1	1.3 *

CURRENT SCHEDULE SLIPPAGES HAVE CAUSED NETWORK TO SLIP -0.57 WORK WEEKS = -2.8 WORK DAYS

TOTAL DURATION 1/ 1/0 THRU 3/28/0 12.43 WORK WEEKS = 62.14 WORK DAYS)

FIGURE 8: PERT-PAC Critical Activity Analysis

MANPOWER PLANNING & CONTROL

From scheduled work packages, WORK-PAC develops

- * Planned manpower
- * Actual manpower expended to-date
- * Projected manpower using production performance data

Special options include:

- * Monthly averaging
- * Trade breakdown detail
- * Manpower Levelling
- * Automatic generation of manhour "S" curve:
 - : planned
 - : actual
 - : projected

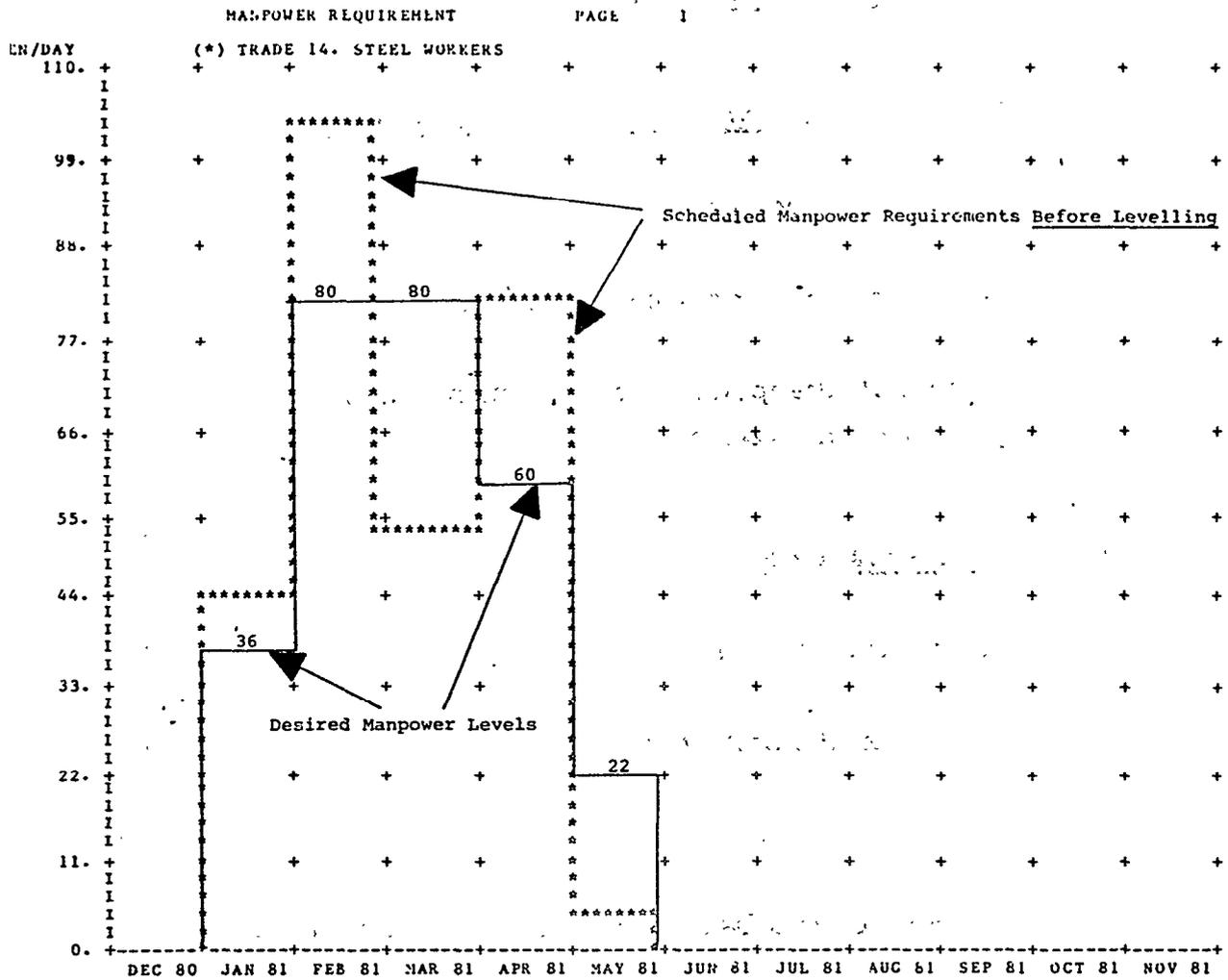


FIGURE 5c: Computer Generated (PERT-PAC) Manloading With Desired Manload Levels Superimposed

MICRONETS

Pre-developed sub-networks:

- * Can be used for any number of projects
- * Can be used as often as needed within a given project
- * Can be linked to other micronets

major Benefits:

- * Increased Confidence in Network By Production and Management
- * Reduced Network Development, Efforts
- * Reduced Data Errors
- * Reduced Opportunities To Neglect Important Activities

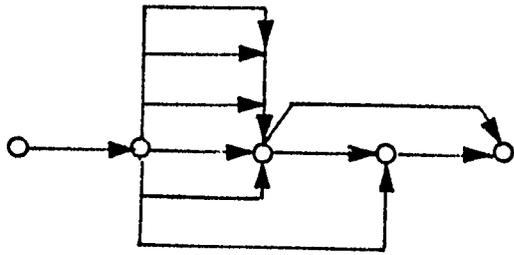
Disciplined & Orderly Network Logic:

- * 'Improved Visibility Even With More Detail
- * Easier Networks To Modify'

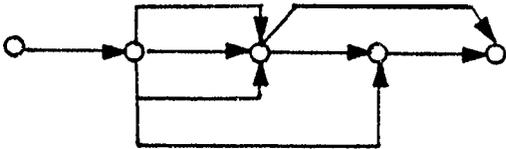
Special Feature

- * Automated Activity Numbering
- * Automated Node Numbering
- * Automated Activity Budget Computations
- * Automated Activity Duration Computations

MICRO-NET



Cloned & Modified
Micro-net



PROJECT NETWORK

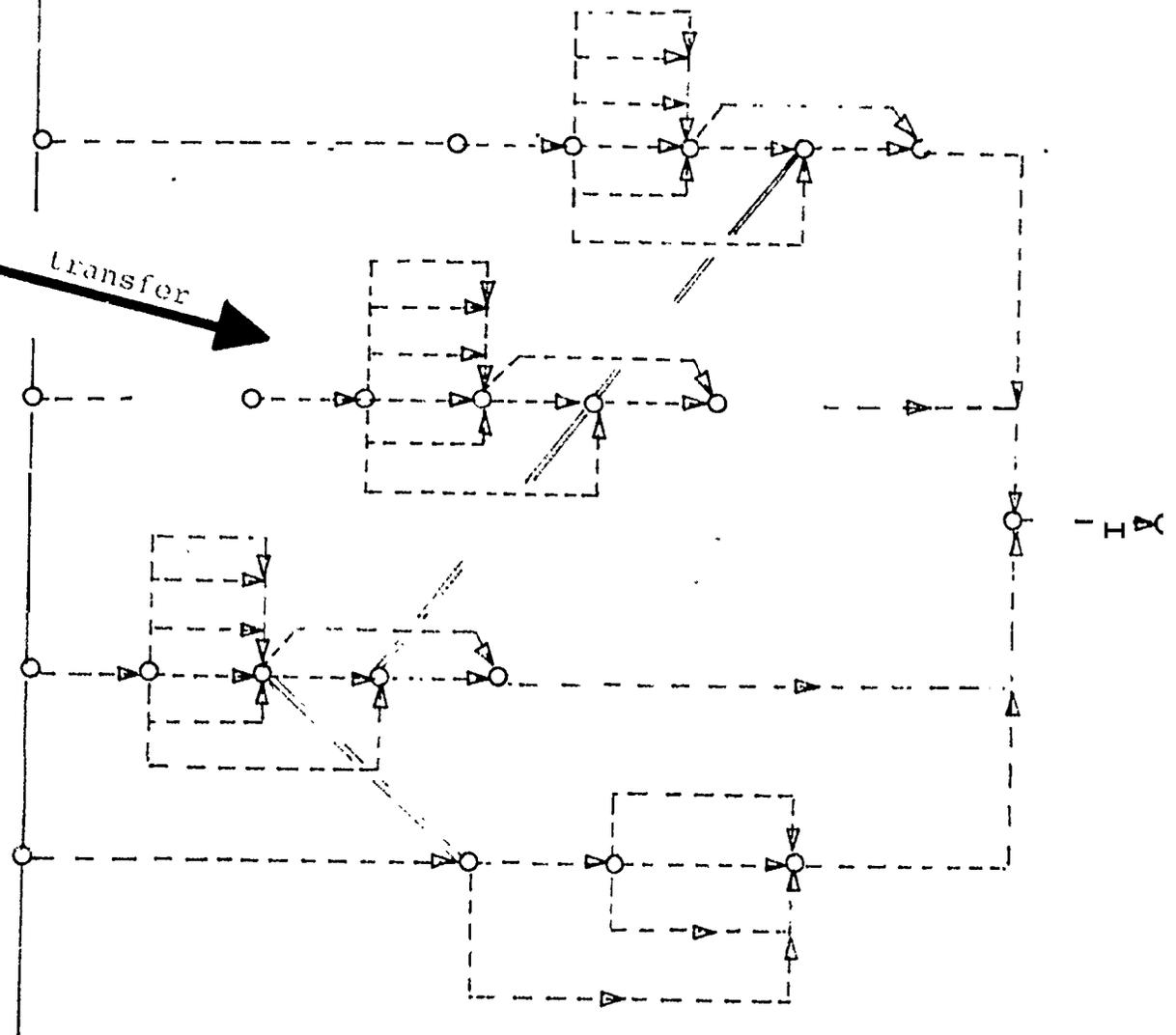
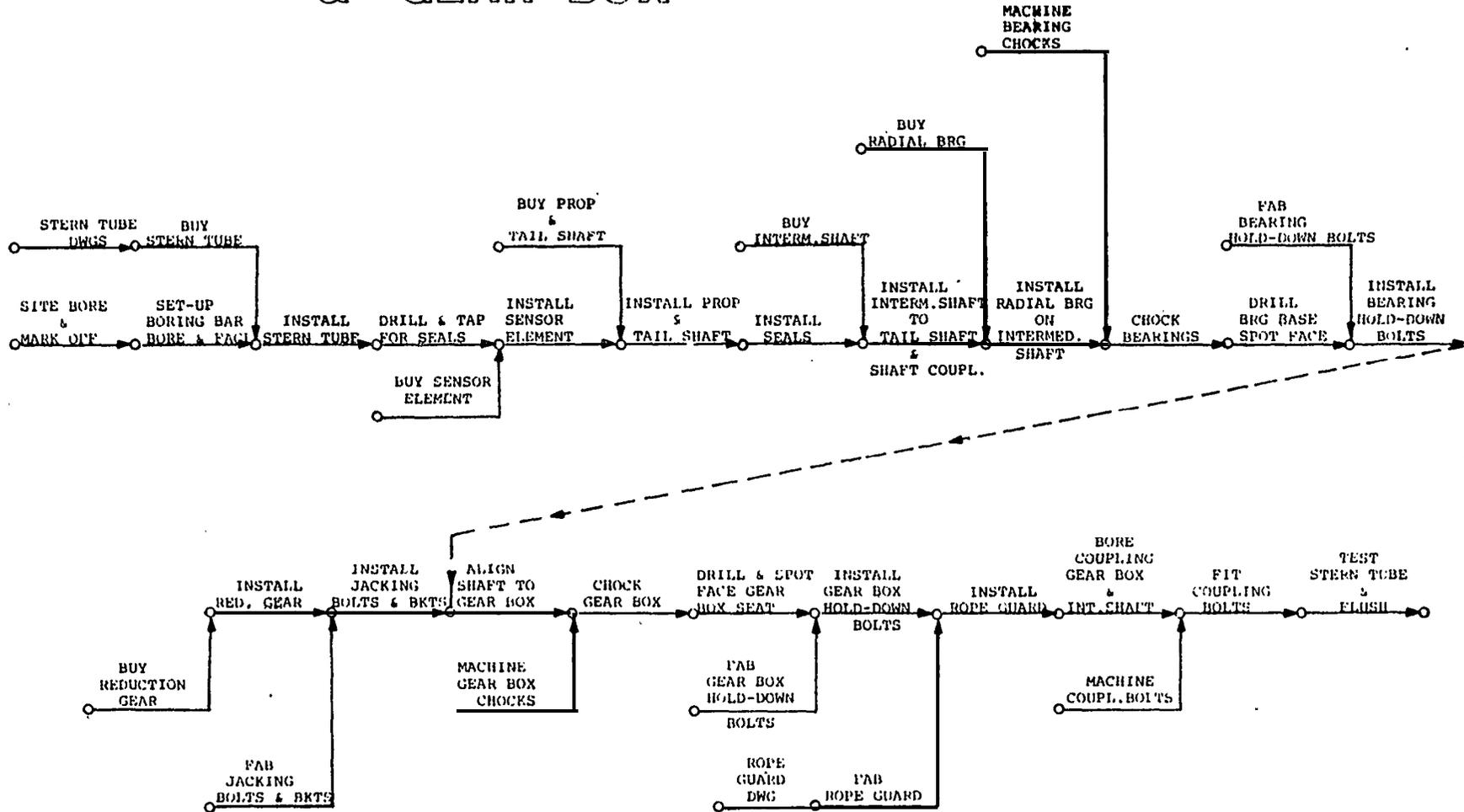


Figure 1: Transfer of micro-net from library to project network

PROPELLER, STERN TUBE, SHAFTING & GEAR BOX



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